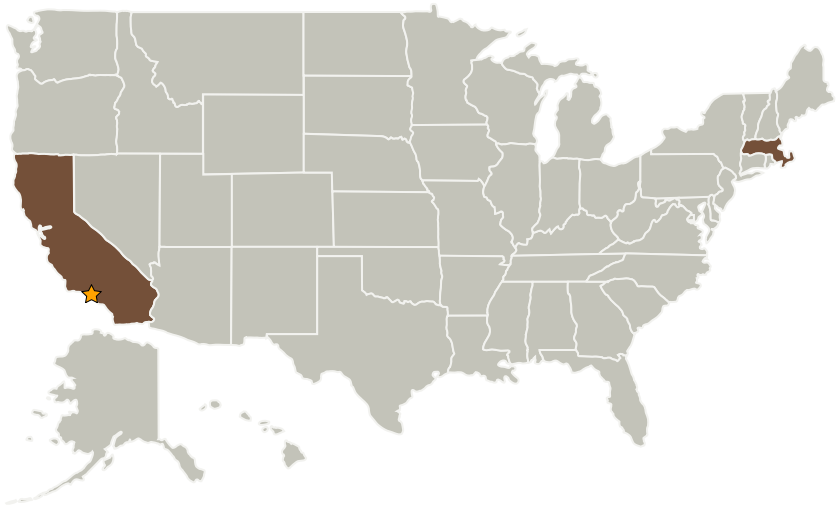
Aerogel Insulation for the Thermal Protection of Venus Spacecraft, Phase I

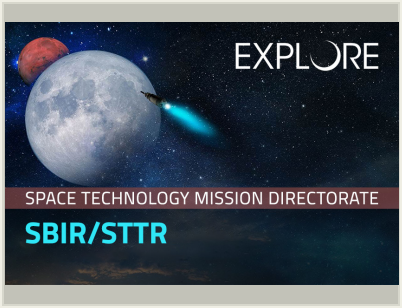
Completed Technology Project (2006 - 2006)

Project Introduction

One of NASA's primary goals for the next decade is the design, development and launch of a spacecraft aimed at the in-situ exploration of the deep atmosphere and surface of Venus. The success of this mis-sion, called VISE (Venus In-Situ Explorer), is reliant on the development of effective thermal insulation solutions capable of protecting spacecraft for extended periods of time from the extreme heat and pressure associated with the lower atmosphere of Venus. Materials intended for exterior application must also be inert towards the sulfuric, hydrochloric and hydrofluoric acid present. Aspen Aerogels, Inc. proposes to develop a revolutionary aerogel composite intended to provide unprecedented thermal and chemical pro-tection to a Venus spacecraft. This unique material is expected to be thermally stable to 2000oC under inert conditions, enabling the possibility for use as a high-temperature heat shield in a Venus deceleration module. This flexible and conformable material will also find use as a thin lightweight thermal protection solution for a Venus pressure vessel. The remarkable thermal properties and ultra low density will afford a significant mass savings over conventional MLI insulation, increasing the operation lifetime and volume of the scientific payload significantly. These materials will also be inert towards the corrosive environ-ment of the Venus atmosphere at high temperatures and pressures, allowing these materials to be utilized in both exterior and interior applications.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Aspen Aerogels, Inc.	Supporting Organization	Industry	Northborough, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.4 Insulation and Interfaces